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Title : Sound and Behavior of Atlantic spotted dolphin: Do we hear what they hear?

Category : Acoustics and Communication

Student :

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Abstract : Underwater behavior of Atlantic spotted dolphin (*Stenella frontalis*) and correlated narrowband (< 20 kHz) vocalizations were recorded from 1985-2001. A broadband sound acquisition system was employed for 20 days (Aug/Sept) in 2002, and 10 days (June 2003) to compare previously described sound types and their function in spotted dolphin behavior. Broadband sounds were sampled at 220 kHz (110 kHz Nyquist), for 10-second sampling block, with a directional hydrophone (-180 dB re 1 μ Pa) and time synchronized underwater video. The presence of a) narrowband vocalizations < 20 kHz only, b) ultrasonic > 20 kHz only, or 3) full bandwidth vocalizations, was scored for all types of vocalizations including tonal whistles (signature whistles, screams, and trills), 2) burst-pulsed vocalizations (squawks, synchronized squawks, buzzes, and cries), and 3) echolocation clicks. The presence of sounds types during behaviorally categories was the same as previously described in the literature. Of 95 whistles measured all had fundamental energy < 20 kHz, 79 had harmonics (sometimes ultrasonic), and 16 had no harmonics. Of 355 burst-pulsed sounds measured, 308 had both narrowband and ultrasonic energy, 29 had energy < 20 kHz only and 18 had energy exclusively in the ultrasonic range. 10% of click trains also showed energy only in the ultrasonic. Of 37 signature whistles recorded repeatedly since 1985, 37 (24 female, 13 male) showed amplitude-modulated features regularly present in specific positions of their whistle contours. Although fundamental frequencies of whistles were always detectable with narrowband recordings, AM features of signature whistles, burst-pulsed vocalizations and clicks were often undetectable without the broadband system. It is likely that the presence of burst-pulsed sounds have been missed regarding their frequency and importance in delphinid communication. Use of broadband, directional recording systems will allow more accurate recording and categorizing of delphinid sounds.